OCTOBER 1950

FOREST STATISTICS

FOR

NEW HAMPSHIRE

Northeastern
Forest Experiment Station
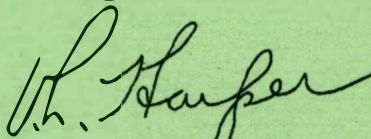
Upper Darby, Pa.
V.L. Harper, Director

FOREWORD

Two previous forest survey releases, one for southern and another for northern New Hampshire, contained statistics on forest area and timber volume. This release for the State as a whole consolidates those forest-area, timber-volume, and ownership data. In addition it presents estimates of current growth of the timber growing stock and of current drain due to the harvesting of timber products. One section of the release contains forest-area and timber-volume estimates for the various counties of the State. The appended material contains explanation of Forest Survey procedure, a discussion of the range of accuracy in the estimates of forest area and timber volume, definitions of technical terms, and a national standard set of tables that will henceforth appear in all state Forest Survey reports. This release for the State as a whole will be followed by a final interpretive report in which the forest situation will be analyzed in some detail.

The Forest Survey in New Hampshire was carried out in collaboration with the State of New Hampshire Forestry and Recreation Commission. This agency, along with the Brown Company of Berlin, New Hampshire, provided the aerial photographs used in the survey. The State Forester reviewed this release prior to publication and offered valuable suggestions.

The New Hampshire Forest Survey is a part of the nation-wide forest survey conducted by the regional forest experiment stations of the Forest Service, United States Department of Agriculture.

V. L. HARPER
Director

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Compiled by

FOREST SURVEY STAFF [1]
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FOREST SURVEY DATA AND PREVIOUS ESTIMATES

ESTIMATES OF FOREST AREAS, timber volume and annual
net growth for the State of New Hampshire have been made
from time to time in the past.   The most recent of these
(prior to the Forest Survey) was made by the Forest Service
and the American Forestry Association in 1945 in connection
with the nation-wide reappraisal of the forest situation.
Until the recent completion of the Forest Survey in the
State, there had been no systematic field work upon which
forest-area and timber-volume estimates could be based.   It
was, therefore, necessary to rely heavily upon general know-
ledge and the judgment of informed persons,

The Survey now provides a much sounder foundation for
all of the basic forest statistics: forest area, timber
volume, current annual net growth, and current drain on the
forest growing stock.

The relative accuracy of these survey data is discussed in the Appendix. The commercial forest area figure, for example, is considered to be within ± 0.6 percent, the saw-timber volume figure within ± 3.9 percent, and growth in saw-timber trees within ± 8.0 percent. In some cases where the reappraisal estimates differ from the Survey (in excess of the sampling error), changes in minimum stand-size specifications are partly responsible. The Survey classifies as saw timber all stands of 1,500 or more board feet per acre; the reappraisal minimum was 2,000 board feet. Pole-timber stands must have at least 200 cubic feet per acre to meet Survey standards, but only 2 cords (130 to 156 cubic feet) were required by the reappraisal. Other differences are due largely to the fact that New Hampshire had no information based on field-survey work. Table 29 (p. 37) gives the actual differences between the Survey and the reapprais-al estimates. These, of course, should not be interpreted as the changes in forest conditions during the interval between reappraisal and Survey. Such comparisons will be possible only when the State is surveyed again.[2]

THE GENERAL FOREST SITUATION

THE FOREST SURVEY shows that approximately 84 percent of the land area of New Hampshire is forest land. It is probable that no other State in the Union, except Maine, has a higher proportion of its land in forests.

Of the 4,847,800 acres of forest land, some 96.6 percent is producing or capable of producing usable crops of timber that are or would be available for commercial use. This total "commercial" forest land amounts to 4,682,200 acres--rather evenly distributed throughout the State. A further 25,000 acres of productive forest land has been withdrawn from commercial timber cutting. Most of this is reserved for special public uses such as state forest parks, municipal watersheds, and national forest recreation areas. The remaining 140,600 acres of forest land is judged to be incapable of yielding usable wood products because of poor site conditions or because of physical inaccessibility. This "noncommercial" forest land is, of course, of value for watershed purposes. Most of it is on the upper slopes.

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[2] RECOGNIZING THAT UP-TO-DATE INFORMATION ON THE CONDITION OF THE FOREST RESOURCE IS ESSENTIAL. CONGRESS HAS PROVIDED THAT THE FOREST SURVEY BE REPEATED PERIODICALLY.

Private owners hold 85 percent
of the commercial forest land

About 85 percent of the commercial forest land is held by private owners. Practically all of the larger holdings are located in the northern part of the State. Elsewhere the pattern is one of small holdings. The 1945 Census of Agriculture reports 1,201,152 acres of farm wood-land. About 83 percent is located in the 100-acre-and-larger farms, of which there are about 7,000.

The publicly owned commercial forest land amounts to about 15 percent of the total. The bulk of it is in the White Mountain National Forest.

Hardwoods predominate

A little more than 58 percent of the commercial forest area now bears stands in which hardwoods are the predominating species. The white pine forest type occupies about 16 percent of the total commercial forest area. On another 7 percent of the acreage, white pine is the dominant species in mixture with hardwoods. On still another 10 percent of the acreage, it is the minor constituent in a mixture of hardwoods. Spruce-fir in relatively pure stands now occupies about 8 percent of the commercial forest acreage. On another 5 percent of the area, it dominates in a mixture of hardwoods, and on 11 percent, it is a minor element in a mixture of hardwoods. Relatively pure stands of aspen occupy about 5 percent of the commercial forest land. The northern hardwood type (maple, birch, and beech) occupies about 26 percent of the total commercial forest acreage.

Good saw-timber stands cover
only 12 percent of forest land

Saw-timber stands, to be commercially significant under present-day conditions, must contain timber of usable quality in volume sufficient to justify the costs of logging. While there is no rigid line of separation between stands that are thus "economically available" and those that are not, tracts that have less than 5,000 board feet per acre are often marginal in respect to operability for sawlog production.

Only 12 percent of New Hampshire's commercial forest land carries a stand of more than 5,000 board feet per acre of saw timber.

Light saw-timber stands (1,500 to 5,000 board feet per acre) occupy 26 percent of the forest land. Pole-timber stands, stocked to a minimum of 10 percent in trees 5 inches and more in diameter, with total volume of at least $2\frac{1}{2}$ cords per acre, cover 37 percent of the commercial forest land. The remaining 25 percent is occupied by saplings and seedlings or is in poorly stocked (stocking less than 10 percent) stands.

Timber-volume estimating
a complicated business

Every system of timber-volume measurement must, of course, set specific limits for each class of material that is being measured. The criteria for saw timber used in this survey include the following specifications: Softwood trees must be 9 or more inches in diameter at breast height; hardwood trees must be 11 or more inches. A saw-timber tree must contain at least 1 merchantable log 8 feet long. The total measurable volume is confined to the portion of the tree stem between stump height and that point on the upper stem where branches, deformity, or diameter make it unusable for sawlog purposes. This limit of merchantability may or may not coincide with that of a particular timber product--much depends on the quality of material that is needed. For high-grade veneer, for instance, the usable timber volume is only a fraction of the total sawlog volume as measured by the Forest Survey. For railroad cross ties and box lumber, the Survey limit is commercially realizable. Timber owners and operators should keep these facts in mind as they use Forest Survey timber-volume data for making business estimates.

Forest industries must necessarily give strict attention to the factors of economic operability--per-acre volume, size of available tracts, difficulty and costs of logging and transportation, and so on. The Forest Survey covering large areas on an extensive basis, cannot include measurements of such factors. The best that can be done is to provide the rough indicator of stand-size class. Data with this breakdown are shown in tables 7, 8, 9 and 10.

Volume measurements on the board-foot basis have
been made according to the International 1/4-inch rule.
Woodland owners and timber operators who use some other
rule should make the appropriate conversion from Interna-
tional. The board-foot volume estimates exclude "cull
trees"--those that are unmerchantable for sawlogs now or
prospectively because of defect or rot. Also excluded is a
percentage of the merchantable tree volume to take account
of the cull material (crook, rot, and other defect) in mer-
chantable sawlogs.

Volume measurements on the standard-cord basis in-
clude all sound material, including that in cull trees.
There is, however, a breakdown to indicate volume that is
in desirable growing stock--saw-timber trees and pole-tim-
ber trees--and volume that is in cull trees and hardwood
saw-timber limbs (tables 12, 14, 16 and 17).

Saw-timber volume
in the better stands

Of the total saw-timber volume of 9.7 billion board
feet, about 45 percent or 4.4 billion board feet is in
stands of more than 5,000 board feet per acre. The average
volume per acre for all of this more-heavily timbered area
is a little more than 7,500 board feet per acre. The soft-
wood species comprise 2.9 billion board feet, of which 1.7
billion is in white pine. The other 1.5 billion is in
hardwood.

Saw-timber volume
in light stands

The volume of saw-timber in stands that are often
marginal, because of low volume per acre, is about 3.8 bil-
lion board feet or 39 percent of the board-foot volume in
saw-timber trees. The average volume per acre for these
stands is 3,100 board feet.

The remaining 1.5 billion board feet of saw-timber
volume is in saw-timber size trees, scattered throughout
pole-timber and sapling and seedling stands. A consider-
able part of this volume is in low-quality trees left
standing in logging operations that removed earlier stands

of timber. Only a minor part of it is economically operable at the present time—except in those instances where the saw-timber size material might be removed along with a cut of pulpwood or some similar product.

Timber volume in
trees of all sizes

In terms of cords—and including saw-timber trees—the total volume in all timber in trees 5 inches in diameter and larger is 64.8 million cords.[3] About 37 percent of this is in the sawlog portions—an average of about 5 cords per acre for the State as a whole—of saw-timber trees. About 40 percent is in pole-timber trees. The other 23 percent is in the top portions of saw-timber trees (both hardwood and softwood), in limbs of hardwood saw-timber trees, and in the sound portions of all cull trees.

The softwood species constitute 45 percent of the total and the hardwoods 55 percent.

Annual net growth
of sawlog material

The current annual net growth of sawlog material[4] is estimated at 456 million board feet. Of this total, some 277 million board feet of growth is in the softwoods. The other 179 million board feet is in the hardwoods.

Annual net growth
in all trees

The total current annual net growth in all trees 5 inches in diameter at breast height and larger (cull trees and limbs excluded) is estimated at 187 million cubic feet of solid wood.[5] In terms of standard cords of rough wood this is about 2.7 million cords. Of this total net growth,

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[3] A STANDARD CORD IS A STACKED PILE OF UNPEELED BOLTS 4 FEET WIDE, 4 FEET HIGH, AND 8 FEET LONG.

[4] THAT IS, THE SAWLOG PORTIONS OF SAW-TIMBER TREES. THE NET GROWTH HAS BEEN ADJUSTED FOR LOSSES DUE TO MORTALITY. GROWTH IN CULL TREES AND LIMBS IS NOT INCLUDED IN NET GROWTH.

[5] EXCLUDING BARK.

60 percent is in saw-timber trees and 40 percent in pole-timber trees. The net growth of saw-timber trees is about evenly divided between softwood and hardwood. Of the total net growth, 43 percent is softwood.

Commodity drain in softwood saw-timber trees exceeds current growth

The current commodity drain on all of the softwood growing stock is approximately equal to the current net growth. Softwood saw-timber trees, however, are cut more rapidly than they are replaced--drain exceeds growth by 34 percent. The over-draft of pine and spruce saw timber is even more excessive. Continuation of this condition will further accelerate encroachment of hardwoods on lands that are natural softwood sites. It also points to a growing scarcity of raw material to supply the softwood lumber industry.

Drain on hardwood only 24 percent of growth

Current commodity drain on the hardwood growing stock (saw timber and pole timber alike) is about one-fourth of current net growth. Increased utilization of hardwood timber is not only possible but desirable for silvicultural reasons, particularly where hardwoods are occupying lands that are more suitable for growing softwoods.

Table 1.--Land area by major classes of forest land, 1948

Class of land	Area	
	Acres	Percent
Forest land:		
Commercial[1]	4,682,200	81.1
Reserved-commercial[1]	25,000	.4
Noncommercial	140,600	2.4
Total forest land	4,847,800	83.9
Nonforest land	927,600	16.1
All land[2]	5,775,400	100.0

[1] See "Definition of Terms" in Appendix.
[2] From Areas of the United States 1940, Bureau of the Census.

Table 2.--Ownership of commercial forest land, 1948

Ownership class and size-of-holding class	Owners		Acreage held	
	Numbers	Percent	Acres	Percent
Private				
Industrial and other nonfarm owners:				
Holdings of more than 25,000 acres	9	(1/)	601,100	12.8
Holdings of 5,000 to 25,000 acres	13	(1/)	138,500	3.0
Holdings of less than 5,000 acres 2/	21,000	59.8	2,059,000	44.0
Total	21,022	59.8	2,798,600	59.8
Farm woodland:				
In farms of 100 acres and more	3/7,020	20.0	995,300	21.2
In farms of less than 100 acres	7,125	20.2	205,900	4.4
Total	14,145	40.2	1,201,200	25.6
All private	35,167	100.0	3,999,800	85.4
Public				
National forest	--	--	580,400	12.4
Other Federal	--	--	5,200	.1
State	--	--	44,500	1.0
County and municipal	--	--	52,300	1.1
All public	--	--	682,400	14.6
Total, commercial forest land	--	--	4,682,200	100.0

1/ Less than 0.05 percent.
2/ Estimated on the basis of sampling procedure.
3/ Estimated on the assumption that all of the 100-acre-and-larger farms contained woodland acreage. Census of Agriculture, 1945.

Table 3.--Commercial forest area by forest type and type group, 1948

Forest type and type group	Area	
	Acres	Percent
White pine	760,000	16.2
White pine-hardwood	331,600	7.1
Hemlock	223,300	4.8
Pitch pine	24,500	.5
Total white pine group	1,339,400	28.6
Spruce-fir	366,300	7.9
Spruce-fir-hardwood	207,100	4.4
Cedar-tamarack-spruce	33,900	.7
Total spruce-fir group	607,300	13.0
Aspen	249,200	5.3
Paper birch	132,100	2.8
Total aspen-paper birch group	381,300	8.1
Northern hardwood	1,230,900	26.3
Hardwood-spruce-fir	494,100	10.6
Hardwood-white pine	444,500	9.5
Oak	94,700	2.0
Ash-maple-elm	90,000	1.9
Total hardwood group	2,354,200	50.3
All types	4,682,200	100.0

Table 4.—Commercial forest area by stand-size class and forest-type group, 1948

Stand-size class	Forest-type group				All forest types	
	White pine	Spruce-fir	Aspen-paper birch	Hardwood	Acres	Percent
	Acres	Acres	Acres	Acres	Acres	Percent
Saw-timber stands of:						
More than 5,000 bd.ft. [1] per acre	266,100	79,600	4,500	231,200	581,400	12.4
1,500-5,000 bd.ft. [1] per acre	444,600	157,200	12,600	612,500	1,226,900	26.2
Pole-timber stands	352,900	286,800	93,600	1,002,700	1,736,000	37.1
Sapling and seedling stands	96,900	44,800	138,200	232,400	512,300	10.9
Poorly stocked stands	178,900	38,900	132,400	275,400	625,600	13.4
All stands	1,339,400	607,300	381,300	2,354,200	4,682,200	100.0

[1] International 1/4-inch rule.

Table 5.--Commercial forest area by stand-size class and watershed, 1948

Stand-size class	Watershed				State total
	Androscoggin	Connecticut	Merrimack	Saco	
	Acres	Acres	Acres	Acres	Acres
Saw-timber stands of:					
More than 5,000 bd.ft.[1]/ per acre	78,500	146,600	226,800	129,500	581,400
1,500-5,000 bd.ft.[1]/ per acre	112,900	371,200	514,600	228,200	1,226,900
Pole-timber stands	127,800	658,900	642,500	306,800	1,736,000
Sapling and seedling stands	47,600	119,300	259,800	85,600	512,300
Poorly stocked stands	33,200	210,900	287,900	93,600	625,600
All stands	400,000	1,506,900	1,931,600	843,700	4,682,200
Percent	8.5	32.2	41.3	18.0	100.0

1/ International 1/4-inch rule.

Table 6.--Ownership of saw timber in New Hampshire, 1948
(International 1/4-inch rule)

Ownership class	Softwood	Hardwood	Total	
	Million bd.ft.	Million bd.ft.	Million bd.ft.	Per-cent
Private				
Industrial and other nonfarm owners	3,713	2,060	5,773	59.4
Farm woodland owners	1,322	890	2,212	22.8
All private	5,035	2,950	7,985	82.2
Public				
National forest	799	808	1,607	16.5
Other Federal	5	2	7	.1
State	27	30	57	.6
County and municipal	45	12	57	.6
All public	876	852	1,728	17.8
Total	5,911	3,802	1/9,713	100.0

1/ Of this total, 45 percent is in stands of more than 5,000 board feet per acre, 39 percent is in stands that range from 1,500 to 5,000 board feet per acre, 16 percent is in scattered saw-timber trees in stands of pole timber and of saplings and seedlings.

Table 7.--Timber volume in live saw timber by stand-size class
and forest-type group, board-foot basis, 1948

(International 1/4-inch rule)

Stand-size class	Forest-type group				All forest types	
	White pine	Spruce-fir	Aspen-paper birch	Hardwood		
	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	Percent
In saw-timber stands of:						
More than 5,000 bd.ft. per acre						
Softwood	1,941,000	470,500	6,100	416,400	2,834,000	29.2
Hardwood	150,900	72,900	33,300	1,277,000	1,534,100	15.8
Total	2,091,900	543,400	39,400	1,693,400	4,368,100	45.0
1,500-5,000 bd.ft. per acre						
Softwood	1,144,100	430,000	4,800	575,100	2,154,000	22.2
Hardwood	155,000	107,200	31,900	1,308,800	1,602,900	16.5
Total	1,299,100	537,200	36,700	1,883,900	3,756,900	38.7
In pole-timber stands						
Softwood	196,400	150,500	32,600	229,800	609,300	6.3
Hardwood	29,500	41,300	22,500	423,900	517,200	5.3
Total	225,900	191,800	55,100	653,700	1,126,500	11.6
In other stands[1]						
Softwood	171,700	4,100	51,000	87,400	314,200	3.2
Hardwood	17,700	4,500	3,000	122,300	147,500	1.5
Total	189,400	8,600	54,000	209,700	461,700	4.7
In all stands						
Softwood	3,453,200	1,055,100	94,500	1,308,700	5,911,500	60.9
Hardwood	353,100	225,900	90,700	3,132,000	3,801,700	39.1
Total	3,806,300	1,281,000	185,200	4,440,700	9,713,200	100.0
Percent	39.2	13.2	1.9	45.7	100.0	

1/ Includes sapling and seedling stands, poorly stocked stands, and unstocked areas.

Table 8.--Timber volume in live sawlog material by stand-size class
and forest-type group, standard-cord[1] basis, 1948

Stand-size class	Forest-type group				All forest types	
	White pine	Spruce-fir	Aspen-paper birch	Hardwood		
	M cords	M cords	M cords	M cords	M cords	Percent
In saw-timber stands of:						
More than 5,000 bd.ft. per acre						
Softwood	4,490	1,185	17	972	6,664	28.9
Hardwood	349	170	77	2,962	3,558	15.5
Total	4,839	1,355	94	3,934	10,222	44.4
1,500-5,000 bd.ft. per acre						
Softwood	2,717	1,070	11	1,326	5,124	22.3
Hardwood	367	262	80	3,077	3,786	16.5
Total	3,084	1,332	91	4,403	8,910	38.8
In pole-timber stands						
Softwood	487	400	86	571	1,544	6.7
Hardwood	69	99	54	1,007	1,229	5.3
Total	556	499	140	1,578	2,773	12.0
In other stands						
Softwood	416	11	120	214	761	3.3
Hardwood	42	10	8	287	347	1.5
Total	458	21	128	501	1,108	4.8
In all stands						
Softwood	8,110	2,666	234	3,083	14,093	61.2
Hardwood	827	541	219	7,333	8,920	38.8
Total	8,937	3,207	453	10,416	23,013	100.0
Percent	38.8	13.9	2.0	45.3	100.0	

[1] A stacked pile of unpeeled bolts 4 feet wide, 4 feet high, and 8 feet long.

Table 9.—Timber volume in live saw-timber trees, by species and stand-size class,

board-foot basis, 1948

(International 1/4-inch rule)

Species	In saw-timber stands of --		In pole-timber stands	In all other stands	Total	
	More than 5,000 bd.ft. per acre		1,500 to 5,000 bd.ft. per acre				
	M bd.ft.	Percent	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	Percent
Softwood							
White pine	1,659,800	17.1	1,104,200	282,600	195,000	3,241,600	33.4
Hemlock	485,300	5.0	500,200	113,900	86,600	1,186,000	12.2
Spruce	485,700	5.0	261,300	107,500	13,700	868,200	8.9
Fir	153,400	1.6	232,300	79,700	9,100	474,500	4.9
Pitch pine	44,100	.4	40,800	10,100	8,200	103,200	1.1
Other softwood	5,700	.1	15,200	15,500	1,600	38,000	.4
All softwood	2,834,000	29.2	2,154,000	609,300	314,200	5,911,500	60.9
Hardwood							
Yellow birch	512,200	5.3	544,500	143,200	39,100	1,239,000	12.8
Sugar maple	366,900	3.8	293,200	76,800	45,800	782,700	8.1
Beech	273,600	2.8	196,100	54,000	2,700	526,400	5.4
Red maple	134,500	1.4	154,900	75,900	7,700	373,000	3.8
Paper birch	107,200	1.1	155,800	67,000	13,400	343,400	3.5
Red oak	56,900	.6	185,900	45,500	22,400	310,700	3.2
Ash	50,700	.5	33,400	7,600	(1/)	91,700	.9
Aspen	3,100	(1/)	3,100	4,900	4,200	15,300	.2
Other hardwood	29,000	.3	36,000	42,300	12,200	119,500	1.2
All hardwood	1,534,100	15.8	1,602,900	517,200	147,500	3,801,700	39.1
All species	4,368,100	45.0	3,756,900	1,126,500	461,700	9,713,200	100.0

1/ Less than 0.05 percent.

Table 10.--Timber volume in live saw-timber trees by diameter
class and stand-size class, board-foot basis, 1948

(International 1/4-inch rule)

| Tree-diameter class (inches at breast height) | In saw-timber stands of -- | | All other stands | Total | |
| | More than 5,000 bd.ft. per acre | 1,500 to 5,000 bd.ft. per acre | | | |
	M bd.ft.	Percent	M bd.ft.	M bd.ft.	M bd.ft.	Percent
Softwood						
9.0 to 10.9	375,800	3.9	465,100	335,300	1,176,200	12.1
11.0 to 12.9	499,000	5.1	475,900	238,700	1,213,600	12.5
13.0 to 14.9	519,400	5.3	334,400	150,500	1,004,300	10.3
15.0 to 16.9	525,100	5.5	266,000	70,000	861,100	8.9
17.0 to 18.9	337,700	3.5	239,000	69,600	646,300	6.7
19.0 to 20.9	303,200	3.1	129,300	7,600	440,100	4.5
21.0 to 22.9	121,100	1.2	68,000	17,200	206,300	2.1
23.0 to 24.9	54,400	.6	28,500	19,300	102,200	1.1
25.0 and more	98,300	1.0	147,800	15,300	261,400	2.7
All softwood	2,834,000	29.2	2,154,000	923,500	5,911,500	60.9
Hardwood						
11.0 to 12.9	258,400	2.6	384,000	241,100	883,500	9.1
13.0 to 14.9	291,700	3.0	350,600	167,700	810,000	8.3
15.0 to 16.9	261,400	2.7	272,800	99,800	634,000	6.5
17.0 to 18.9	220,100	2.3	198,300	60,300	478,700	4.9
19.0 to 20.9	154,700	1.6	122,600	51,800	329,100	3.4
21.0 to 22.9	98,700	1.0	100,000	28,500	227,200	2.4
23.0 to 24.9	67,600	.7	90,000	7,100	164,700	1.7
25.0 and more	181,500	1.9	84,600	8,400	274,500	2.8
All hardwood	1,534,100	15.8	1,602,900	664,700	3,801,700	39.1
All species	4,368,100	45.0	3,756,900	1,588,200	9,713,200	100.0

Table 11.--Timber volume in other than sawlog material[1], by stand-size
class and forest-type group, standard-cord basis, 1948

Stand-size class	Forest-type group				All forest types	
	White pine	Spruce-fir	Aspen-paper birch	Hardwood	M cords	Percent
	M cords	M cords	M cords	M cords	M cords	Percent
In saw-timber stands:						
Softwood	3,439	1,631	69	1,239	6,377	15.3
Hardwood	2,716	1,589	244	10,471	15,020	35.9
Total	6,155	3,220	313	11,710	21,397	51.2
In pole-timber stands						
Softwood	1,458	1,978	154	1,101	4,691	11.2
Hardwood	1,169	909	1,278	8,825	12,181	29.2
Total	2,627	2,887	1,432	9,926	16,872	40.4
In other stands						
Softwood	945	92	61	231	1,329	3.2
Hardwood	298	21	397	1,451	2,167	5.2
Total	1,243	113	458	1,682	3,496	8.4
In all stands						
Softwood	5,841	3,701	284	2,571	12,397	29.7
Hardwood	4,183	2,519	1,919	20,747	29,368	70.3
Total	10,024	6,220	2,203	23,318	41,765	100.0
Percent	24.0	14.9	5.3	55.8	100.0	--

[1] Includes tops of saw-timber trees, pole-timber trees, sound portions of cull
trees, and limbs of hardwood saw-timber trees.

Table 12.--Timber volume in all live trees (5 inches d.b.h. and larger)
by stand-size class and kind of material, standard-cord
basis, 1948

Stand-size class	In trees of saw-timber size		In trees of pole-timber size	Cull trees and limbs	Total
	Sawlog portion	Top portion			
	$\underline{M}$ cords	$\underline{M}$ cords	$\underline{M}$ cords	$\underline{M}$ cords	$\underline{M}$ cords
In saw-timber stands of:					
More than 5,000 bd.ft. per acre	10,222	1,886	3,558	1,874	17,540
1,500 to 5,000 bd.ft. per acre	8,910	1,993	8,634	3,452	22,989
Total in saw-timber stands	19,132	3,879	12,192	5,326	40,529
In pole-timber stands	2,773	721	12,398	3,753	19,645
In all other stands	1,108	240	1,523	1,733	4,604
Total in all stands	23,013	4,840	26,113	10,812	64,778

Table 13.--Timber volume in all live trees (5 inches d.b.h. and larger) by species and stand-size class, standard-cord basis, 1948

Species	Saw-timber stands	Pole-timber stands	Other stands	Total[1]	
	M cords	M cords	M cords	M cords	Percent
Softwood					
White pine	9,043	2,382	1,526	[2]12,951	22.2
Spruce	3,207	1,302	100	4,609	7.9
Hemlock	3,350	702	322	4,374	7.5
Fir	2,181	1,584	105	3,870	6.6
Pitch pine	285	76	32	393	.7
Other softwood	99	189	5	293	.5
All softwood	18,165	6,235	2,090	26,490	45.4
Hardwood					
Yellow birch	6,269	2,248	475	8,992	12.8
Red maple	3,205	2,903	341	6,449	9.2
Sugar maple	3,941	1,818	461	6,220	8.8
Paper birch	2,382	2,420	293	5,095	7.3
Beech	3,494	830	140	4,464	6.4
Red oak	1,505	1,167	452	3,124	4.5
Ash	515	432	52	999	1.4
Aspen	114	416	76	606	.9
Other hardwood	939	1,176	224	[3]2,339	3.3
All hardwood	22,364	13,410	2,514	38,288	54.6
All species	40,529	19,645	4,604	64,778	100.0
Percent[1]	63.0	29.8	7.2	100.0	--

1/ Percentages were computed for greater accuracy, on the cubic-foot basis.

2/ Includes 244,000 cords of red pine.

3/ Includes 873,000 cords of so-called noncommercial species such as gray birch, pin cherry and hophornbeam.

Table 14.--Timber volume in all live trees (5 inches d.b.h. and larger)
by species and kind of material, standard-cord basis, 1948

Species	Trees of saw-timber size		Pole-timber trees	Cull trees and limbs	Total
	Sawlog portion	Top portion			
	M cords	M cords	M cords	M cords	M cords
Softwood					
White pine[1]	7,483	637	3,046	1,785	12,951
Spruce	2,286	193	2,055	75	4,609
Hemlock	2,802	259	1,108	205	4,374
Fir	1,167	97	2,469	137	3,870
Pitch pine	258	27	82	26	393
Other softwood	97	10	180	6	293
All softwood	14,093	1,223	8,940	2,234	26,490
Hardwood					
Yellow birch	2,883	1,172	2,304	2,633	8,992
Red maple	889	354	3,847	1,359	6,449
Sugar maple	1,802	713	2,089	1,616	6,220
Paper birch	830	318	3,461	486	5,095
Beech	1,250	522	1,500	1,192	4,464
Red oak	728	313	1,381	702	3,124
Ash	214	80	541	164	999
Aspen	40	13	535	18	606
Other hardwood[2]	284	132	1,515	408	2,339
All hardwood	8,920	3,617	17,173	8,578	38,288
All species	23,013	4,840	26,113	10,812	64,778

[1] Includes 244,000 cords of red pine.
[2] Includes 873,000 cords of so-called noncommercial species
such as gray birch, pin cherry, and hophornbeam.

Table 15.--Timber volume in all live trees (5 inches d.b.h. and larger) by diameter classes, standard-cord and cubic-foot bases, 1948.

Tree-diameter class (Inches at breast height)	Volume		Percentage distribution	
			By class	Cumulative, smallest to largest
	M cords	M cu. ft.	Percent	Percent
Softwood				
5.0 - 6.9	4,265	333,200	16.1	16.1
7.0 - 8.9	4,980	387,000	18.8	34.9
9.0 - 10.9	3,841	300,200	14.5	49.4
11.0 - 12.9	3,417	266,600	12.9	62.3
13.0 - 14.9	2,808	219,300	10.6	72.9
15.0 - 16.9	2,172	169,600	8.2	81.1
17.0 - 18.9	1,616	126,300	6.1	87.2
19.0 - 20.9	1,113	86,800	4.2	91.4
21.0 - 22.9	556	42,800	2.1	93.5
23.0 - 24.9	371	28,200	1.4	94.9
25 and larger	1,351	105,800	5.1	100.0
Total	26,490	2,065,800	100.0	--
Hardwood				
5.0 - 6.9	6,586	427,600	17.2	17.2
7.0 - 8.9	6,969	454,800	18.2	35.4
9.0 - 10.9	5,360	348,600	14.0	49.4
11.0 - 12.9	3,867	250,600	10.1	59.5
13.0 - 14.9	3,522	230,000	9.2	68.7
15.0 - 16.9	2,986	193,400	7.8	76.5
17.0 - 18.9	2,374	154,300	6.2	82.7
19.0 - 20.9	1,838	118,900	4.8	87.5
21.0 - 22.9	1,264	81,600	3.3	90.8
23.0 - 24.9	1,110	73,000	2.9	93.7
25 and larger	2,412	155,900	6.3	100.0
Total	38,288	2,488,700	100.0	--

Table 16.—Ownership of timber volume in all live trees (5 inches d.b.h. and larger) by
kind of material, standard-cord and percent of cubic-foot volume bases, 1948

| Ownership class | In trees of saw-timber size | | | | Pole-timber trees | | Cull trees and limbs | | Total | |
| | Sawlog portion | | Top portion | | | | | | | |
	M cords	Percent	M cords	Percent	M cords	Percent	M cords	Percent	M cords	Percent
Private										
Industrial and other nonfarm	13,597	21.8	2,712	4.1	15,685	23.9	6,129	9.1	38,123	58.9
Farm woodland	4,866	7.8	1,056	1.6	5,992	9.1	2,776	4.1	14,690	22.6
Total private	18,463	29.6	3,768	5.7	21,677	33.0	8,905	13.2	52,813	81.5
Public										
National forest	4,194	6.7	997	1.5	3,903	6.0	1,712	2.5	10,806	16.7
Other Federal	14	(1/)	2	(1/)	14	(1/)	3	(1/)	33	(1/)
State	178	.3	44	.1	317	.4	118	.2	657	1.0
County and municipal	164	.3	29	(1/)	202	.4	74	.1	469	.8
Total public	4,550	7.3	1,072	1.6	4,436	6.8	1,907	2.8	11,965	18.5
All ownerships	23,013	36.9	4,840	7.3	26,113	39.8	10,812	16.0	64,778	100.0

1/ Less than 0.05 percent.

Table 17.--Timber volume in live cull trees (5 inches d.b.h. and larger) by cull-tree class, standard-cord basis, 1948.

Cull-tree class	Softwood	Hardwood	Total
	M cords	M cords	M cords
Trees of saw-timber size			
Sound cull trees 1/	1,730	1,246	2,976
Unsound cull trees 1/	217	5,307	5,524
Total	1,947	6,553	8,500
Pole-timber trees			
Sound cull trees 1/	162	923	1,085
Unsound cull trees 1/	115	830	945
Total	277	1,753	2,030
Total all cull-tree classes	2,224	8,306	10,530

1/ Sound wood only.

Table 18.--Estimated current annual net growth of timber on
commercial forest lands, cubic-foot basis, 1948

Item	Softwood	Hardwood	All species
	M cu.ft.	M cu.ft.	M cu.ft.
Growth on primary growing stock[1]	67,800	77,600	145,400
Ingrowth--saplings that become pole timber	17,500	34,700	52,200
Total growth in living trees	85,300	112,300	197,600
Normal mortality	4,800	5,500	10,300
Net current annual growth	80,500	106,800	187,300

1/ Includes the sawlog and top portion of saw-timber trees and
the pole-timber trees. Excludes cull trees and limbs.

Table 19.—Estimated current annual net growth[1] of timber
by tree-size class, board-foot and cubic-foot
bases, 1948

Tree-size class	Board-foot basis	Cubic-foot basis	
	M bd.ft.	M cu.ft.	Percent
Saw-timber trees			
Softwood	276,800	56,400	30
Hardwood	178,800	55,700	30
All saw timber	455,600	112,100	60
Pole-timber trees			
Softwood	--	24,100	13
Hardwood	--	51,100	27
All pole timber	--	75,200	40
Saw timber and pole timber			
Softwood	276,800	80,500	43
Hardwood	178,800	106,800	57
Total	455,600	187,300	100

[1] Board foot growth includes growth on the sawlog
portion of saw-timber trees plus sawlog-material increment
due to the volume of pole-timber trees that annually reach
saw-timber size. Cubic foot growth includes growth on all
the primary growing stock plus the volume of saplings that
annually reach pole-timber size.

Table 20.--Harvest of primary timber products, 1947

Timber-product class	In standard units of volume measurement		In cubic feet of solid wood	
	Quantity	Unit	M cubic feet	Percent
Sawlogs[1]	317,487	M bd. ft.[2]	58,475	54.1
Veneer logs[3]	3,656	" " "	677	.6
Cooperage bolts[3]	6,739	" " "	1,672	1.6
Pulpwood[4]	242,093	Standard cords	19,326	17.8
Fuel wood[5]	279,272	" "	7,412	6.8
Poles[6]	5,506	Pieces	125	.1
Posts[7]	425,199	"	358	.3
Other products[3]	1,126	M cu.ft.	1,126	1.0
Total products	--	--	89,171	82.3
Logging waste[8]	--	--	19,229	17.7
Total commodity drain	--	--	108,400	100.0

1/ Based on lumber production as reported by Bureau of the Census, with adjustment for estimated net receipt of 5,032 thousand board feet of sawlogs from other states.
2/ International 1/4-inch rule.
3/ Based on field survey of the consuming mills.
4/ Based on pulpwood consumption as reported by Bureau of the Census, with adjustments for estimated net receipt of 109,123 cords from Canada and other states.
5/ Based on data obtained by field survey of fuel-wood consumption.
6/ Based on data from field survey of post consumption.
7/ Based on data from field survey of pole producers.
8/ Estimate based on data from a field survey of a sample of logging operations.

Table 21.--Commodity drain on the forest growing stock by
tree-size class, board-foot and cubic-foot
bases, 1947

Tree-size class	Board-foot basis	Cubic-foot basis	
	M bd.ft.	M cu.ft.	Percent
Saw-timber trees			
Softwood	355,700	75,700	69.8
Hardwood	44,600	12,800	11.8
All saw timber	400,300	88,500	81.6
Pole-timber trees			
Softwood	--	6,600	6.1
Hardwood	--	13,300	12.3
All pole timber	--	19,900	18.4
Saw timber and pole timber			
Softwood	355,700	82,300	75.9
Hardwood	44,600	26,100	24.1
Total	400,300	108,400	100.0

Table 22.--Relationship of current annual net growth to commodity
drain of timber products, 1947

Tree-size class	Current annual growth	Commodity drain	Surplu. (+) Deficit (-)	Drain as percent of growth
	M cu.ft.	M cu.ft.	M cu.ft.	Percent
Saw-timber trees				
Softwood	56,400	75,700	-19,300	134
Hardwood	55,700	12,800	+42,900	23
Total	112,100	88,500	+23,600	79
Pole-timber trees				
Softwood	24,100	6,600	+17,500	27
Hardwood	51,100	13,300	+37,800	26
Total	75,200	19,900	+55,300	26
Saw timber and pole timber				
Softwood	80,500	82,300	- 1,800	102
Hardwood	106,800	26,100	+80,700	24
Total	187,300	108,400	+78,900	58

STATISTICS FOR THE SEVERAL COUNTIES

THE FOLLOWING TABLES, numbered 23 through 28, contain forest-area and timber-volume estimates by counties. In using these data it should be understood that county estimates, in an extensive survey of this kind, cannot be as accurate as those for the State as a whole.

Table 23.--Commercial and noncommercial forest area, by counties, 1948

County	Commercial forest	Reserved-commercial and noncommercial forest	Total forest	Nonforest	Total land area
	Acres	Acres	Acres	Acres	Acres
Belknap	206,400	1,500	207,900	48,700	256,600
Carroll	525,400	9,100	534,500	65,800	600,300
Cheshire	389,700	3,600	393,300	65,600	458,900
Coos	984,200	60,500	1,044,700	123,300	1,168,000
Grafton	866,400	77,000	943,400	155,500	1,098,900
Hillsborough	442,300	9,300	451,600	118,000	569,600
Merrimack	480,200	3,000	483,200	112,700	595,900
Rockingham	327,200	1,200	328,400	113,800	442,200
Strafford	179,400	400	179,800	61,500	241,300
Sullivan	281,000	--	281,000	62,700	343,700
State total	4,682,200	165,600	4,847,800	927,600	5,775,400

Table 24.--Ownership of commercial forest land, by counties, 1948

| County | Private | | Public | | Total |
	Industrial and other nonfarm	Farm woodland	Federal	State, county, & municipal	
	Acres	Acres	Acres	Acres	Acres
Belknap	120,000	81,000	800	4,600	206,400
Carroll	307,700	78,600	132,700	6,400	525,400
Cheshire	288,000	89,700	900	11,100	389,700
Coos	699,300	106,200	168,700	10,000	984,200
Grafton	347,500	224,100	279,000	15,800	866,400
Hillsborough	278,500	152,000	--	11,800	442,300
Merrimack	296,600	161,600	3,500	18,500	480,200
Rockingham	190,600	128,700	--	7,900	327,200
Strafford	110,700	65,800	--	2,900	179,400
Sullivan	159,700	113,500	--	7,800	281,000
State total	2,798,600	1,201,200	585,600	96,800	4,682,200

Table 25.--Commercial forest area by counties and forest-type groups, 1948

| County | Forest-type group | | | | All forest types |
	White pine	Spruce-fir	Aspen-paper birch	Hardwood	
	Acres	Acres	Acres	Acres	Acres
Belknap	125,700	14,700	26,400	39,600	206,400
Carroll	150,700	28,400	32,500	313,800	525,400
Cheshire	147,800	11,300	26,000	204,600	389,700
Coos	27,900	322,700	74,000	559,600	984,200
Grafton	121,900	170,400	93,800	480,300	866,400
Hillsborough	193,000	14,500	82,200	152,600	442,300
Merrimack	214,100	17,000	32,400	216,700	480,200
Rockingham	163,300	3,300	---	160,600	327,200
Strafford	109,600	---	14,000	55,800	179,400
Sullivan	85,400	25,000	---	170,600	281,000
State total	1,339,400	607,300	381,300	2,354,200	4,682,200

Table 26.--Commercial forest area by counties and stand-size classes, 1948

| County | Stand-size class | | | | All stands |
	Saw-timber stands	Pole-timber stands	Sapling & seedling stands	Poorly stocked stands	
	Acres	Acres	Acres	Acres	Acres
Belknap	92,300	46,500	37,800	29,800	206,400
Carroll	315,800	138,000	32,400	39,200	525,400
Cheshire	115,100	158,500	68,400	47,700	389,700
Coos	426,700	372,000	85,800	99,700	984,200
Grafton	296,100	394,300	57,400	118,600	866,400
Hillsborough	135,600	154,100	72,100	80,500	442,300
Merrimack	198,900	144,700	72,300	64,300	480,200
Rockingham	95,300	123,900	49,500	58,500	327,200
Strafford	41,900	75,700	32,400	29,400	179,400
Sullivan	90,600	128,300	4,200	57,900	281,000
State total [1]	1,808,300	1,736,000	512,300	625,600	4,682,200

[1] Of this total, 581,400 acres carry a stand of more than 5,000 board feet per acre; the remaining 1,226,900 acres carry a stand of from 1,500 to 5,000 board feet per acre. Further breakdown not warranted by Survey data.

Table 27.--Timber volume of live saw timber, by counties,
board-foot basis, 1948
(International 1/4-inch rule)

County	Softwood	Hardwood	All species
	M bd.ft.	M bd.ft.	M bd.ft.
Belknap	329,800	65,700	395,500
Carroll	914,400	717,600	1,632,000
Cheshire	404,600	143,100	547,700
Coos	950,000	1,383,900	2,333,900
Grafton	890,400	756,600	1,647,000
Hillsborough	448,700	81,700	530,400
Merrimack	877,600	328,700	1,206,300
Rockingham	495,500	118,900	614,400
Strafford	292,800	24,700	317,500
Sullivan	307,700	180,800	488,500
State total	5,911,500	3,801,700	1/ 9,713,200

1/ Of this total, 4,368,100 M board feet are in
stands that contain more than 5,000 board feet per acre;
3,756,900 M board feet are in stands of 1,500 to 5,000
board feet per acre; the remaining 1,588,200 M board feet
are in scattered trees in the stands of pole timber and of
saplings and seedlings.

Table 28.--Timber volume in all live trees (5 inches d.b.h.
and larger) by counties, standard-cord basis, 1948

County	Softwood	Hardwood	All species
	M cords	M cords	M cords
Belknap	1,221	943	2,164
Carroll	3,494	5,586	9,080
Cheshire	1,820	2,661	4,481
Coos	5,327	10,482	15,809
Grafton	3,857	8,280	12,137
Hillsborough	2,222	2,057	4,279
Merrimack	3,536	3,186	6,722
Rockingham	2,204	2,043	4,247
Strafford	1,450	494	1,944
Sullivan	1,359	2,556	3,915
State total	26,490	38,288	64,778

Table 29.--Comparison of Forest Survey estimates with the "reappraisal"
estimates: State of New Hampshire

Item	Forest Survey estimate (1948)	Reappraisal estimate1/ (1945)	Survey sampling error	Relationship of reappraisal estimate to Survey estimate
				(+ High) (- Low)
	M acres	M acres	Percent	Percent
Commercial forest area in--				
Saw-timber stands	1,808	1,589	± 3.9	- 12.1
All other stands	2,874	3,133	± 2.5	+ 9.0
Total	4,682	4,722	± 0.6	+ 0.9
	Million bd.ft.	Million bd.ft.		
Saw-timber volume in--				
Saw-timber stands	8,125	5,827	± 5.4	- 28.3
All other stands	1,588	1,783	± 13.0	+ 12.3
Total	9,713	7,610	± 3.9	- 21.7
Softwood species	5,911	3,424	± 7.0	- 42.1
Hardwood species	3,802	4,186	± 8.0	+ 10.1
	Million cu.ft.	Million cu.ft.		
Timber volume in all live trees 5 inches d.b.h. and larger2/				
In saw-timber trees	2,009	1,815	± 3.9	- 9.7
In pole-timber trees	1,813	1,563	± 4.0	- 13.8
Total	3,822	3,378	± 2.4	- 11.6
Softwood species	1,891	1,425	± 4.0	- 24.6
Hardwood species	1,931	1,953	± 4.0	+ 1.1
	Million bd.ft.	Million bd.ft.		
Annual net growth in--				
Softwood species	277	174	± 12.4	- 37.2
Hardwood species	179	215	± 13.8	+ 20.1
Total	456	389	± 8.0	- 14.7
	Million cu.ft.	Million cu.ft.		
Softwood species	80	73	± 12.2	- 8.8
Hardwood species	107	109	± 10.1	+ 1.9
Total	187	182	± 7.1	- 2.7

1/ Based on judgment estimates. No field-survey data were available.
2/ Excluding cull trees and limbs.
Note: For further explanation of comparability of these estimates, see page 2.

FOREST SURVEY PROCEDURE

THE FOREST SURVEY ESTIMATES of forest area and timber volume are based on data obtained by sampling methods. The samples consist of a large number of plots distributed regularly over the entire State. These plots are first spotted by machine on aerial photographs--eliminating whatever bias might develop from placing them by hand. Trained photo interpreters examine each plot on the photographs and determine whether it is forest or nonforest. The forest plots are then examined further under stereoscope and classified according to stand-size class (saw timber, pole timber, sapling and seedling stands, etc.) and to forest type.

The next step is a field examination of a further sample drawn at random from the previously examined aerial photographs. The number of ground plots visited is governed by the calculated intensity necessary to attain results that are within the permissible sampling error. Data recorded from these field plots include species, volume, and growth. The volume measurements are adjusted to a net-volume basis by making the appropriate deductions for cull. Growth measurements also include the necessary deduction for normal mortality. The photo-interpretation and the field-plot data are transcribed to punch cards in the Station office and are tabulated by machine.

The growth estimates are based on measurements of tree-diameter growth--determined by means of "increment borer" cores taken from sample trees on the field plots. These provide data on the growth rate of trees currently living, including pole timber that reaches saw-timber size and saplings that reach pole-timber size in the course of a year. These growth-rate data are arranged by tree-diameter class and applied to growing-stock volume data similarly arranged. This produces a figure for the gross volume of wood currently being put on by the primary growing stock. This gross figure is then adjusted to "net growth" by deducting the expected annual normal mortality--losses from

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[6] FOR EXPLANATION OF THIS TERM SEE THE FOLLOWING SECTION WHICH CONTAINS DEFINITIONS

suppression, windthrow, endemic (but not epidemic) attack by insects and tree diseases, normal (but not abnormal) forest fires, and other causes of similar character. These normal mortality estimates are based on measurements of timber on the field plots that have been lost through these agents during the past 5 years. Some element of personal judgment is involved in this determination.

The drain estimates are derived by several different methods. Bureau of the Census data on lumber production serve as the basis for the estimate of drain of sawlog material for lumber. A supplementary sampling survey revealed that there is a small net receipt of sawlogs. The lumber sawlog drain figure is, therefore, slightly below the lumber production figure. The pulpwood drain figure is based on information obtained by a 100-percent canvass of the pulp mills, covering 1946 receipts of pulpwood. The 1946 data were adjusted to accord with pulpwood consumption (reported by the Bureau of the Census) in New Hampshire in 1947. This method is believed to have given a reasonably good estimate of a normal level of pulpwood drain. The estimates of fuelwood and fence post drain are based on a sampling survey of the consumption of these two commodities. Estimates of the drain for veneer logs and cooperage bolts are based on a field survey of the consuming mills. The estimate of drain for poles is based on a field survey of pole producers. Drain for other products is estimated on the basis of a survey of the consuming mills. The estimate of the volume of logging waste is based on a field survey of sample logging operations.

ACCURACY OF THE ESTIMATES

THE FOREGOING DATA are subject to two kinds of error. Nonsampling errors include faults such as mistakes in measurement, reporting biases, and imperfect volume tables. There is no way of estimating how large these errors may be. But, through close supervision of all phases of the field and computational work an attempt was made to keep them to a minimum.

Sampling errors, based on one standard deviation, tell how large a difference from the true value to expect based on sampling alone. For data that are normally distributed, the true value is expected within the indicated range about two times in three. These measures of accuracy are reported for state totals of major items. They would be larger for subdivisions of the state totals. In general, as shown below, inventory data on New Hampshire as a whole are more accurate than growth and drain data; area data are superior to volume data; cubic-feet volume is better than board-feet volume.

The calculated sampling errors in state-wide data are as follows:

	Percent (Plus or minus)
Forest area	0.6
Saw-timber area	3.9
Pole-timber area	5.2
Timber volume, board-foot basis	3.9
Timber volume, in saw-timber stands, board-foot basis	5.4
Timber volume, in pole-timber stands, cubic-foot basis	6.0
Total timber volume, cubic-foot basis	2.4
Growth (board-foot basis)	8.0
Growth (cubic-foot basis)	7.1
Drain (cu. ft. of primary growing stock)	7.2

DEFINITION OF TERMS

Forest land

Forest land.--Land that bears forest growth stocked at least to 10 percent with trees of any size capable of producing wood products; land that formerly bore such growth and has not yet been put to any other use; afforested land. To classify as forest land a tract must contain at least 1 acre.

Commercial forest land.--Forest land that is producing or is capable of producing usable crops of wood (usually saw timber), that is economically available now or prospectively, and has not been withdrawn from timber cutting.

Reserved-commercial forest land.--Commercial forest land that has been withdrawn from commercial timber use through statute, ordinance, or administrative order.

Noncommercial forest land.--Forest land not capable of producing usable wood products because of poor site or because of physical or permanent economic inaccessibility.

Tree classes

   Saw-timber trees.--Softwood trees not less than 9 inches in diameter at breast height (d.b.h.) and hardwood trees not less than 11 inches d.b.h. A saw-timber tree must contain at least one log 8 feet long. Not less than half of the gross volume of the tree must be merchantable material.

   Pole-timber trees.--Softwood and hardwood trees not less than 5 inches d.b.h. but less than the minimum size for saw timber. Such trees must be of merchantable quality or must have prospects of becoming merchantable.

   Saplings and seedlings.--Trees of less-than-pole-timber size.

   Cull trees.--Live trees of saw-timber or pole-timber size that are unmerchantable for sawlogs now or prospectively because of defect or rot.

Stand-size and stocking classes

   Saw-timber stands.--Stands of saw-timber trees having a net volume per acre of not less than 1,500 board feet.

   Pole-timber stands.--Stands failing to meet the saw-timber stand requirement but being at least 10 percent stocked with pole-timber and larger trees. Not less than half the stocking must be in pole-timber trees, and net volume must be not less than 200 cubic feet per acre.

   Sapling and seedling stands.--Areas not meeting the saw-timber stand or pole-timber stand requirements, but being at least 10 percent stocked with trees. Not less than half the stocking must be in saplings and seedlings.

   Nonstocked stands.--Areas that fail to meet the minimum requirements for saw-timber, pole-timber, and sapling and seedling stands.

Timber volume

Board-foot volume.--Includes the sawlog material in saw-timber trees estimated through use of the International 1/4-inch rule, which closely approximates green lumber tally for square-edged boards. Merchantable heights for sawlogs were estimated to the point at which utilization is limited by large branches, forks, or other deformities, or a diameter inside bark (d.i.b.) of not less than 6 inches for softwoods and 8 inches for hardwoods. Deductions have been made for cull—rot, crook, and other defects.

Cubic-foot volume.--Includes the sound wood, excluding bark, in: (1) the sawlog portion of saw-timber trees, (2) the upper stems of softwood saw-timber trees and the upper stems and limbs of hardwood saw-timber trees to a minimum of 4 inches inside bark, (3) the full stems of pole-timber trees to a minimum of 4 inches inside bark, and (4) the sound wood volume of cull trees. No deductions were made for cull unless it affected the wood structure.

Volume in cords.--This volume was derived from the net cubic-foot volume (excluding bark) by applying a factor of 78 cubic feet per cord for softwoods and 65 cubic feet per cord for hardwoods. Although the number of cubic feet per cord varies with the size of material, these converting factors were used for all material in this report. The resulting figures approximate the volume of a standard stacked cord (4 feet by 4 feet by 8 feet), including bark. No deductions were made for cull unless it affected the wood structure.

Forest-type groups

White pine.--The principal types included are white pine (white pine making up 75 percent or more of the stand), hemlock (hemlock pure or predominant over any single associate), and white-pine hardwood (white pine comprising 50 to 74 percent of the stand). Stands in which pitch pine make up 75 percent or more of the stand also are included in this type group.

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Spruce-fir.--Spruce and balsam fir make up 75 per-
cent of the spruce-fir stands and 50 to 74 percent of the
spruce-fir-hardwood stands. A small area of the cedar-tam-
arack-spruce type is included.

Aspen-paper birch.--Small pure stands of quaking and
bigtooth aspen or extensive areas of paper birch, or stands
in which aspen and paper birch predominate in mixture with
spruce, balsam fir, and red maple.

Hardwood.--Hardwoods are predominant in the stands
included in this type group. The northern hardwood type,
made up largely of yellow birch, sugar maple, and beech is
the principal one in this large group. Next in importance
is the hardwood-spruce-fir type in which spruce and fir
make up 20 to 49 percent of the stand in mixture with hard-
woods. The hardwood-white pine, ash-maple-elm, and oak
types also are included in this type group.

Primary and secondary growing stock

Primary growing stock.--The net volume, in cubic
feet, of live saw-timber and pole-timber trees from stump
to the 4-inch d.i.b. point of the central stem. Primary
growing stock excludes all limbwood and cull-tree volume.

Secondary growing stock.--The net volume, in cubic
feet, of live cull trees and limbwood not less than 4
inches d.i.b.

Growth and drain

Current annual net growth.--The increase during a
current year in the net volume of primary growing stock.
Net growth is what is left after deducting the losses due
to normal (but not catastrophic) mortality.

Normal mortality.--The net volume of primary growing
stock lost to the live-timber inventory through natural
causes other than catastrophic events such as large fires
and insect or disease epidemics.

Commodity drain. - The net volume of primary growing stock removed in a given year for use as commercial timber products. It includes the volume in the products as such, and also the volume of primary growing stock that has been left in the woods as logging waste.

SPECIES

THE VARIOUS TREE species found in this area are listed below.[7] Approved common names are shown in parentheses if these differ from the brief name used in the tables. Approved scientific names are underlined. If two or more species are included under a single name in the tables, the various species are listed or the word "species" appears after the approved scientific name for the genus.

Softwoods

Spruce (Red spruce)	- Picea rubens
(White spruce)	- Picea glauca
(Black spruce)	- Picea mariana
Fir (Balsam fir)	- Abies balsamea
Hemlock (Eastern hemlock)	- Tsuga canadensis
White pine (Eastern white pine)	- Pinus strobus
(Red pine)	- Pinus resinosa
Pitch pine	- Pinus rigida
Other softwoods	
(Northern white-cedar)	- Thuja occidentalis
(Atlantic white-cedar)	- Chamaecyparis thyoides
(Eastern redcedar)	- Juniperus virginiana
(Tamarack)	- Larix laricina

Hardwoods

Sugar maple	- Acer saccharophorum
Red maple	- Acer rubrum
Red oak (Northern red oak)	- Quercus borealis
Yellow birch	- Betula lutea
Paper birch	- Betula papyrifera
Beech (American beech)	- Fagus grandifolia
Ash	- Fraxinus spp.
Aspen	- Populus spp.

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[7] U.S. FOREST SERVICE. CHECK LIST OF THE NATIVE AND NATURALIZED TREES OF THE UNITED STATES. INCLUDING ALASKA. U.S. DEPT. AGR. 325 PP. 1944.

Other hardwoods
    (White oak)   -   Quercus alba
    (American basswood)   -   Tilia americana
    (Elm)   -   Ulmus spp.
    (Hickory)   -   Carya spp.
    (Butternut)   -   Juglans cinerea
    (Willow)   -   Salix spp.
    (Gray birch)   -   Betula populifolia
    (Sweet birch)   -   Betula lenta
    (Eastern hophornbeam)   -   Ostrya virginiana
    (Black cherry)   -   Prunus serotina

NATIONAL STANDARD TABLES

THE FOLLOWING TABLES, numbered 30 through 38, constitute a uniform set of statistics that will henceforth appear in all state and regional Forest Survey reports. They are published in this form to facilitate the combining of Forest Survey information for two or more such areas. A considerable part of the data in these national standard tables duplicates information contained in tables 1 to 29.

Table 30.--Land area by major classes of forest land.
New Hampshire, 1948

Class of land	Land area
	Thousand acres
Forest land:	
Commercial	4,682
Noncommercial	79
Reserved	
Commercial-reserved	25
Noncommercial-reserved	62
Total forest land	4,848
Nonforest land[1]	927
Total land	5,775

[1] The Census Bureau data for land area include bodies of inland water up to 40 acres. In the Forest Survey it has been possible to exclude all inland water bodies that exceed 1 acre. The difference in this instance amounts to 56,000 acres.

Table 31.--Commercial forest land area by ownership class by
stand-size class. New Hampshire, 1948

Ownership class	Total	Saw-timber stands	Pole-timber stands	Seedling & sapling stands	Nonstocked & other areas n.e.c.[1]
	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres
Federally owned or managed:					
National forest	580	314	184	33	49
Indian	--	--	--	--	--
Other	5	--	4	1	--
Total Federal	585	314	188	34	49
State	45	12	26	7	--
County and municipal	52	10	14	21	7
Private	4,000	1,472	1,508	450	570
Total all ownerships	4,682	1,808	1,736	512	626

1/ Not elsewhere classified.

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Table 32.--Volume of live saw timber and primary growing stock
on commercial forest land by stand-size class. New
New Hampshire, 1948

Stand-size class	Volume	
	Live saw timber	Primary growing stock
	Million bd. ft.	Million cu.ft.
Saw-timber stands	8,125	2,512
Pole-timber stands	1,126	1,104
Seedling and sapling stands	256	101
Nonstocked and other areas not elsewhere classified	206	105
Total all stands	9,713	3,822

Table 33.--Volume of live saw timber and primary growing stock on commercial forest land by ownership class. New Hampshire, 1948

Ownership class	Volume	
	Live saw timber	Primary growing stock
	Million bd.ft.	Million cu.ft.
Federally owned or managed		
National forest	1,607	645
Indian	--	--
Other	7	2
Total Federal	1,614	647
State	57	38
County and municipal	57	28
Private		
Farm	2,212	843
Industrial and other	5,773	2,266
Total private	7,985	3,109
Total all ownerships	9,713	3,822

Table 34.--Volume of live saw timber and primary growing stock on
commercial forest land by species. New Hampshire, 1948

| Species[1] | Volume | |
	Live saw timber	Primary growing stock
	Million bd.ft.	Million cu.ft.
Softwoods:		
Spruce and balsam fir	1,343	645
Red and white pines	3,241	870
Hemlock	1,186	325
Other eastern softwoods	141	51
Total softwoods	5,911	1,891
Hardwoods:		
White oaks[2]	38	27
Red oaks[3]	311	157
Yellow birch	1,239	413
Sugar maple	783	299
Soft maple	373	331
Beech	526	213
Ash	92	54
Cottonwood and aspen	15	38
Basswood	31	5
Other eastern hardwoods[4]	394	394
Total hardwoods	3,802	1,931
Total all species	9,713	3,822

1/ Species from the national standard list that do not appear
here are either not present in New Hampshire or were found so in-
frequently that no reliable estimate of volume could be made.
2/ Includes only Quercus alba.
3/ Includes only Quercus borealis.
4/ Includes 343,000,000 board feet and 300,000,000 cubic feet of
paper birch.

Table 35.--All-timber volume on commercial forest land by kind
of material. New Hampshire, 1948

Kind of material	Volume
	Million cubic feet
Live all timber	
Primary growing stock	3,822
Secondary growing stock	732
Total	4,554
Salvable dead all timber	--
Total all timber	4,554

Table 36.--Net growth and normal mortality of live saw timber and
primary growing stock on commercial forest land by species
group. New Hampshire, 1948

Species group	Live saw-timber volume		Primary growing stock	
	Current annual net growth	Current annual normal mortality	Current annual net growth	Current annual normal mortality
	Million board feet		Million cubic feet	
Softwoods	277	7	80	5
Hardwoods	179	14	107	5
Total	456	21	187	10

Table 37.--Commodity drain of live saw-timber and primary growing
stock on commercial forest land by species group.
New Hampshire, 1947

Species group	Live saw-timber volume			Primary growing stock		
	Cutting drain[1]	Logging waste	Commodity drain[2]	Cutting drain[1]	Logging waste	Commodity drain[2]
	Million board feet			Million cubic feet		
Softwoods	351	4	355	70	12	82
Hardwoods	45	(3/)	45	19	7	26
Total	396	4	400	89	19	108

1/ Volume of the primary products harvested within the State.

2/ Total of cutting drain plus logging waste.

3/ Less than 1/2 million.

Table 38.--Commodity production by timber products in cubic volume and in standard units. New Hampshire, 1947

Timber products class	Quantity		
	Cubic volume	Standard units	
		Unit	Number
	M cubic feet		
Sawlogs (for lumber, timber and sawn ties)	58,475	M board feet[1]	317,487
Veneer logs and bolts	677	M board feet[1]	3,656
Cooperage logs and bolts	1,672	M board feet[1]	6,739
Pulpwood logs	--	---	---
Pulpwood bolts	19,326	Standard cords[2]	242,093
Fuelwood	[3]7,412	Standard cords[2]	279,272
Chemical wood	---	---	---
Piling	--	---	---
Poles	125	Pieces	5,506
Posts (round and split)	358	Pieces	425,199
Hewn ties	---	---	---
Round mine timbers	---	---	---
Miscellaneous	1,126	Cubic feet	1,126
Total all products	89,171	---	---

[1] Board feet, International 1/4-inch rule.

[2] Standard cords--rough wood (unpeeled). A pile of stacked wood 4 feet by 4 feet by 8 feet.

[3] Excludes 166,360 cords that were cut from material not classified as growing stock--dead trees, cull trees, and logging and milling waste.